

# Audit

# Report



OFFICE OF THE INSPECTOR GENERAL

**CAPACITY AND UTILIZATION OF DOD MAINTENANCE  
DEPOTS**

Report Number 92-127

August 14, 1992

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August 14, 1992

MEMORANDUM FOR ASSISTANT SECRETARY OF DEFENSE (PRODUCTION AND LOGISTICS)  
ASSISTANT SECRETARY OF THE NAVY (FINANCIAL MANAGEMENT)  
ASSISTANT SECRETARY OF THE AIR FORCE (FINANCIAL MANAGEMENT AND COMPTROLLER)  
INSPECTOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Audit Report on the Capacity and Utilization of DoD Maintenance Depots (Report No. 92-127)

We are providing this final report for your information and use. Comments from the Assistant Secretary of Defense (Production and Logistics), Army, Navy and Air Force on a draft of this report were considered in preparing this final report. The audit evaluated the measurement of capacity and utilization of DoD maintenance depots.

Comments on a draft of this report conformed to the requirements of DoD Directive 7650.3 and there are no unresolved issues. Therefore, no additional comments are required.

The courtesies extended to the audit staff are appreciated. If you have any questions on this audit, please contact Mr. Dennis Payne at (703) 692-3414 (DSN 222-3414) or Mr. Tilghman Schrader at (703) 692-3413 (DSN 222-3413). The distribution of this report is listed in Appendix F.

Edward R. Jones  
Deputy Assistant Inspector General  
for Auditing

Enclosure

cc:  
Secretary of the Army  
Secretary of the Navy  
Secretary of the Air Force

Office of the Inspector General, DoD

AUDIT REPORT NO. 92-127  
(Project No. 1LB-5017)

August 14, 1992

CAPACITY AND UTILIZATION OF DOD MAINTENANCE DEPOTS

EXECUTIVE SUMMARY

**Introduction.** This audit was initiated in August 1991 at the request of the Director of Maintenance Policy, Office of the Assistant Secretary of Defense (Production and Logistics) to evaluate capacity and utilization measurements of DoD maintenance depots. In a June 30, 1990, memorandum, "Strengthening Depot Maintenance Activities," the Deputy Secretary of Defense directed the Military Departments to achieve \$3.9 billion in depot maintenance savings by FY 1995. The Military Departments plan to achieve \$640 million of this savings through depot capacity and utilization improvements.

**Objectives.** Our overall audit objective was to determine the effectiveness of the Military Departments in measuring the capacity and utilization of their maintenance depots. Our specific audit objectives were to evaluate the procedures and methodologies used for calculating capacity and utilization data; to determine the accuracy, validity, and uniformity of the capacity baselines established and of the utilization reported by the Military Departments; and evaluate the applicable internal controls.

**Audit Results.** Although improvements have been made, the weapon systems maintenance depots' capacity and utilization data reported by the Military Departments to the Office of the Secretary of Defense (OSD) were not accurate or complete. Inaccuracies for the nine depots reviewed ranged from an understatement of capacity of 2,469,000 direct labor hours (reported capacity was only 18.4 percent of actual capacity) to an overstatement of capacity of 826,000 direct labor hours (19 percent overstatement). As a result, OSD could not rely on the maintenance depots' capacity baseline data reported by the Military Departments for making decisions, including decisions relating to achieving the FY 1991 through FY 1995 savings of \$640 million that the Military Departments are to achieve through more efficient capacity utilization of their maintenance depots.

**Internal Controls.** Internal controls were inadequate to ensure the accuracy, validity, and uniformity in the capacity and utilization data reported to OSD. See Finding for details on these weaknesses and Part I for details of our review of internal controls.

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**Potential Benefits of Audit.** The potential monetary benefits could not be quantified. Additional details on the potential monetary and other benefits are included in Appendix D.

**Summary of Recommendations.** We recommended that the Assistant Secretary of Defense (Production and Logistics) formalize the updated guidance in the revised draft of DoD Handbook 4151.15-H. We also recommended that the Military Departments implement effective internal control procedures that will provide for full compliance with the requirements of the revised draft of DoD Handbook 4151.15-H.

**Management Comments.** The Assistant Secretary of Defense (Production and Logistics), Army, Navy, and Air Force agreed to take recommended corrective actions. No additional comments are required.

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This report was prepared by the Logistics Support Directorate, Office of the Assistant Inspector General for Auditing, DoD. Copies of the report can be obtained from the Information Officer, Audit Planning and Technical Support Directorate, at (703) 694-6303.

## PART I - INTRODUCTION

### Background

This audit was initiated at the request of the Director of Maintenance Policy, Office of the Assistant Secretary of Defense (Production and Logistics), to evaluate the Military Departments' capacity and utilization data reported in the June 1991 draft of the Defense Depot Maintenance Council's "Corporate Business Plan - FY 1991 through 1995." The Corporate Business Plan was revised in December 1991 and approved for issuance by the Assistant Secretary of Defense (Production and Logistics) on February 7, 1992. The Assistant Secretary of Defense's (Production and Logistics) senior advisory group on depot maintenance matters is the Defense Depot Maintenance Council. Council members include the Assistant Secretary of Defense (Production and Logistics); Director, Defense Logistics Agency; the Commander, U.S. Army Materiel Command; the Commander, Air Force Materiel Command; the Deputy Chief of Naval Operations (Logistics); the Deputy Chief of Staff for Installations and Logistics, Headquarters, U.S. Marine Corps; and the Deputy Assistant Secretary of Defense (Logistics).

In his June 30, 1990, memorandum, "Strengthening Depot Maintenance Activities," the Deputy Secretary of Defense directed the Military Departments to achieve \$3.9 billion in depot maintenance savings over the 5-year period from FY 1991 through FY 1995. The Corporate Business Plan details the commitments the Military Departments have made to achieve this \$3.9 billion in savings. This includes estimated savings of \$640 million that are to be achieved through improved depot capacity utilization.

Before the establishment of the Corporate Business Plan, the Defense Depot Maintenance Council tasked a study team from the Office of the Secretary of Defense (OSD) and the Military Departments to develop recommendations for an improved depot capacity and utilization measurement process. The "Capacity Measurement Improvement Study Report," was submitted to the Assistant Secretary of Defense (Production and Logistics) on December 5, 1990. The Joint Logistics Commanders agreed to abide by the recommendations made in this study when reporting capacity and utilization data.

### Objectives

Our overall audit objective was to determine the effectiveness of the Military Departments in measuring the capacity and utilization of their maintenance depots. Our specific audit objectives were to evaluate the procedures and methodologies used for calculating capacity and utilization data; to determine the

accuracy, validity, and uniformity of the capacity baselines established and of the utilization reported by the Military Departments; and to evaluate the applicable internal controls.

### Scope

We evaluated the Military Departments' compliance with capacity and utilization measurement and reporting procedures contained in DoD Handbook 4151.15-H, "Depot Maintenance Production Shop Capacity Measurement Handbook," July 28, 1976, and its December 1990 revised draft. Definitions of capacity and utilization terms used in the revised draft handbook are summarized in Appendix A.

We used the work load, capacity, and utilization data reported in the June 1991 draft of the Defense Depot Maintenance Council's "Corporate Business Plan - FY 91-95," as the capacity baseline for evaluation. We selected nine depots, at least one depot from each of the Military Services, to test the accuracy, validity, and uniformity of the data reported in the Corporate Business Plan. Capacity and utilization of Navy drydocks at naval shipyards were excluded from the scope of the audit.

In addition to evaluating the capacity baseline in the Corporate Business Plan, we statistically sampled capacity measurement data for 182 workshops from current records at seven depots for evaluation. The two naval shipyards identified only six workshops and we evaluated capacity measurement data for five of those six workshops. Operations research analysts from the Office of the Inspector General, DoD, assisted the auditors in selecting and evaluating the statistical sample of the seven maintenance depots.

This performance audit was made from August 1991 through February 1992 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD, and accordingly included such tests of internal controls as were considered necessary. Activities visited or contacted during the audit are listed in Appendix E.

### Internal Controls

Controls assessed. The audit included an evaluation of the adequacy of the depots' internal controls for ensuring the accuracy, validity, and uniformity of capacity and utilization data as required by DoD Handbook 4151.15-H and its December 1990 revised draft.

**Internal control weaknesses.** The audit identified material internal control weaknesses as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. We found weaknesses in each Military Department's capability to ensure the accuracy, validity, and uniformity of the capacity and utilization data reported to OSD. These material weaknesses are discussed in detail in Part II of this report. All recommendations in this report, if implemented, will assist in correcting these weaknesses. We could not quantify the monetary benefits associated with correcting these internal control weaknesses. A copy of the report will be provided to the senior officials responsible for internal controls within the Army, Navy, and Air Force.

**Prior Audits and Other Reviews**

We did not identify any prior audits during the past 5 years that specifically addressed the measurement of capacity and reporting of utilization of DoD maintenance depots.

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## PART II - FINDING AND RECOMMENDATIONS

### DEVELOPING AND REPORTING DEPOT CAPACITY AND UTILIZATION

Although improvements have been made, the weapon systems maintenance depots' capacity and utilization data that the Military Departments reported to OSD were inaccurate or incomplete. Inaccuracies for the nine depots reviewed ranged from an understatement of capacity of 2,469,000 direct labor hours (reported capacity was only 18.4 percent of actual capacity) to an overstatement of capacity of 826,000 direct labor hours (19 percent overstatement). This occurred because the Military Departments did not fully comply with the requirements for calculating capacity and utilization data contained in the July 1976 DoD Handbook 4151.15-H and its December 1990 revised draft. Delays in formally issuing the draft revision to DoD Handbook 4151.15-H and certain ambiguities in the revised draft also contributed to these deficiencies. As a result, OSD could not rely on the maintenance depots' capacity baseline data reported by the Military Departments for making decisions, including decisions relating to achieving the FY 1991 through FY 1995 savings of \$640 million that the Military Departments are to achieve through more efficient capacity utilization of their maintenance depots.

### DISCUSSION OF DETAILS

#### Background

Capacity measurement improvement study. The "Capacity Measurement Improvement Study Report," dated December 5, 1990, completed Phase I of a joint initiative in DoD to size the organic industrial base by providing the methods for measuring current capacity and utilization of the Military Departments' maintenance depots. In the study report, the Joint Logistics Commanders agreed to begin Phase II of the joint initiative. Phase II included measuring capacity and utilization and identifying reserve capacity in accordance with the methodologies in the proposed December 1990 revision to DoD Handbook 4151.15-H.

The data collected during Phase II were to be further analyzed to determine the target level of peacetime utilization for each depot. Peacetime utilization level is to be the level that meets mobilization and contingency requirements while permitting the depots to continue to operate in a cost-effective manner. In Phase III, the Military Departments are to identify specific actions needed to drive depots toward target utilization levels by the close of FY 1993.

**Interim advisory report.** In November 1991, at the request of the Deputy Assistant Secretary of Defense (Logistics), Office of the Assistant Secretary of Defense (Production and Logistics), we issued an interim advisory report showing that the Military Departments were not working toward achieving the objective of determining the target level of peacetime utilization for each depot. Our report stated that in the draft June 1991 Corporate Business Plan, each Military Department prepared and reported specific capacity, work load, and utilization data using only two of seven new criteria (see Appendix B) that were contained in the draft revision to DoD Handbook 4151.15-H. The two new criteria that were used by the Military Departments were 1,615 direct labor hours for each work position in a depot and a 95-percent availability factor for each work position.

At the time of our November 1991 interim advisory report, officials from the Military Departments indicated that the capacity, work load, and utilization data in the draft June 1991 Corporate Business Plan were to satisfy the specific objectives of the Corporate Business Plan and a continuing effort was not being made to implement new procedures and methodologies or to update data within the Military Departments on a regular basis. Military Department officials further stated that new procedures were not being fully implemented because OSD had not formally issued the draft revision to DoD Handbook 4151.15-H.

**Corporate Business Plan finalized.** The draft June 1991 Corporate Business Plan was finalized in December 1991 and was approved for distribution and use by the Assistant Secretary of Defense (Production and Logistics) on February 7, 1992. The only adjustment made to the draft June 1991 capacity, work load, or utilization data was for the capacity index reported for the Anniston Army Depot. The adjusted index for the Anniston Army Depot was not consistent with any capacity data that the Army provided to our audit staff.

### **Implementation of Procedures and Methodologies**

The Military Departments did not follow or fully implement the guidance and procedures in either version of DoD Handbook 4151.15-H, which were needed to ensure uniform, accurate, and reliable measurement and reporting of capacity and utilization data.

**Records retention.** Five of the nine Military Department activities did not retain the records used to calculate the data reported in the draft June 1991 Corporate Business Plan, although this was a requirement of DoD Handbook 4151.15-H. As a result, the data reported in the Corporate Business Plan could not be traced to the workshops at the depots to effectively evaluate the data for their uniformity, accuracy, or validity.

**Uniform cutoff dates.** Uniform cutoff dates for calculating capacity data were not used. For example, Navy aviation depots used data before November 1990 for inclusion in the draft June 1991 Corporate Business Plan, while, the Marine Corps used March 1991 as the cutoff date. One Army depot used January 1991 as its cutoff. The depots used different cutoff dates because the 1976 DoD Handbook did not specify cutoff dates and the cutoff date in the revised draft handbook was unofficial.

**Other procedures.** The revised draft DoD Handbook 4151.15-H specified other procedures that DoD maintenance depots were to implement to effectively control the developing and reporting of uniform capacity and utilization data. The depots did not effectively implement these procedures which included:

- o Establishing an independent organization to validate the capacity and utilization data measured and reported to OSD. None of the nine depots implemented this procedure.

- o Developing training plans for industrial engineers or other specialists for accomplishing capacity measurements. None of the nine depots had plans for training specialists in measuring capacity and utilization data.

- o Applying specified methodologies for computing capacity and utilization. Each depot, except the Air Force logistics centers, was improperly calculating capacity or utilization for maintenance done in areas with nonspecific or changing work positions such as quality assurance, direct maintenance support, or variable product mixes. This is discussed in more detail later in the report.

- o Identifying and justifying reserve and excess capacity. None of the depots identified and justified their reserve and excess capacity properly.

- o Calculating peacetime, mission, and mobilization indexes. None of the depots calculated these indexes properly.

**Current Guidance.** A contributing cause for the Military Departments' ineffective implementing procedures and methodologies was that existing guidance in the 1976 DoD Handbook 4151.15-H had not been emphasized and enforced. For example, at one Army depot and one Navy shipyard, maintenance personnel responsible for computing capacity had never heard of DoD Handbook 4151.15-H. The lack of emphasis also resulted in a wide variance among the Military Departments in the use of industrial engineers and the level of personnel expertise in the capacity measurement process. Additionally, contrary to the requirements in the guidance, the Military Departments had no historical records of prior capacity, work load, and utilization

measurements. Because of these weaknesses in existing procedures, the Military Departments did not have an adequate system of internal controls and were reluctant to implement the revised December 1990 guidance.

#### **Accuracy of Military Department Data**

We were unable to fully evaluate the accuracy of the maintenance depot capacity and utilization data that the Military Departments reported to OSD in the Corporate Business Plan because the Military Departments did not retain sufficient supporting records. Therefore, we randomly selected 182 workshops at seven Military Department maintenance depots and judgmentally selected five of six workshops at two depots in the naval shipyards to evaluate the accuracy of the Military Departments' depot capacity and utilization data. Based on our evaluation, we determined that the Military Departments' capacity and utilization data were inaccurate and incomplete.

As detailed in Appendix C, seven of the nine depots understated reported capacity from a low of 214,000 direct labor hours (reported capacity was 95.3 percent of actual capacity) at the Anniston Army Depot to a high of 2,469,000 direct labor hours (reported capacity was only 18.4 percent of actual capacity) at the Charleston Naval Shipyard. Although the variances at some depots, such as the Anniston Army Depot, appear relatively insignificant, the variances at the individual workshop levels had wide ranges of understatements and overstatements. At Anniston Army Depot, this ranged from a 10,740 direct labor hour understatement (reported capacity was 75.9 percent of actual capacity) to a 9,206 direct labor hour overstatement (17.6 percent overstatement) among the 23 workshops reviewed. Specific Military Department results are discussed in the following paragraphs.

**Army capacity and workload data.** The overall capacity data recorded at the Anniston Army Depot was understated by 214,000 direct labor hours (reported capacity was 95.3 percent of actual capacity) while Corpus Christi Army Depot overstated its capacity by 826,000 direct labor hours (19 percent overstatement). The inaccurate data were caused primarily by the Army's reduced emphasis on procedures for maintaining its data base on capacity and utilization at the workshop level. As a result, data at the depots were outdated and shop drawings of workshops at the depots were incomplete or incorrect. For instance, at the Anniston Army Depot, an ammunition maintenance function was totally excluded from capacity measurement.

The two Army depots also used improper methodology to calculate capacity for quality assurance personnel. In accordance with DoD Handbook 4151.15-H, the amount of direct labor hours are

estimated for quality assurance personnel. Only direct labor hours of the quality assurance personnel are to be included in the capacity calculation of the workshops. From our analysis of FY 1991 labor hours, we determined that the two Army depots overstated the direct labor hours for quality assurance personnel by improperly counting their indirect labor hours as direct labor hours. Only about 78 percent of the total hours should have been included in the capacity calculation.

Personnel at the two Army depots did not have access to projected work load for FY 1991 through FY 1995 for determining the reserve and excess capacity of their workshops, as required by the revised draft DoD Handbook 4151.15-H. The work loads were determined by Army Depot Systems Command and the Army Materiel Command; however, the data were distributed to the Army depots for only the current year and these data were not distributed promptly. As a result, the Army depots did not have the data, methodology, or records necessary to prepare the work load for each workshop and could not determine reserve capacity, excess capacity, and utilization. Conversely, Army Depot Systems Command had summary data but did not have accurate, detailed records on the workshops at each depot necessary to compute the same requirements.

Naval shipyards' capacity and workload data. The Norfolk and Charleston Naval Shipyards substantially understated their capacity. The procedures that the naval shipyards used were contrary to the methodologies prescribed in the draft revised DoD Handbook 4151.15-H. For example, naval shipyards excluded entire maintenance workshops and uncovered, or open, outdoor work areas in the shipyards. These exclusions represented over 2.4 million direct labor hours of capacity.

Maintenance personnel justified excluding some workshops from capacity computation because covered workshops that supported naval drydocks on the waterfront were not included in Naval Sea System Command's specific guidance to the shipyards for computing capacity. Officials at Naval Sea Systems Command and the maintenance personnel at the shipyards further explained that DoD Handbook 4151.15-H did not list the type of workshops they excluded as being a reportable requirement. According to Navy officials, the workshops were excluded because the work load was divided between maintenance on the ships in the shipyard and equipment brought into the workshops. This product mix was not predictable. Additionally, Navy officials stated that although the capacity was measurable, it did not have a cause and effect relationship to the output of the workshops; therefore, these workshops should be excluded from capacity measurement. We disagree with the Navy's position. We believe if capacity is measurable, it should be measured in accordance with the draft revised DoD Handbook 4151.15-H.

Naval shipyards also used an incorrect or undeterminable methodology for calculating capacity. Instead of identifying work positions as required by DoD Handbook 4151.15-H, the maintenance personnel at the Norfolk Naval Shipyard simply averaged the total personnel on the payroll in one maintenance shop with the total major machines and workbenches in this maintenance shop and multiplied the average by a 60-percent availability factor. This result served as the work positions in the formula for calculating capacity. The balance of the work positions was determined by the number of personnel on the payroll.

The maintenance personnel at the Charleston Naval Shipyard could not provide complete documentation detailing their calculations of capacity. They broadly interpreted the criteria in DoD Handbook 4151.15-H in justifying their calculations of capacity. The guidance in the handbook uses indefinite terms such as infrequently, frequently, or not continuously utilized, as criteria for counting equipment as work positions. Consequently, they estimated that 40 percent of their equipment was not used continuously and excluded work positions that should have been included in calculating capacity. We believe that clarifying criteria in the DoD Handbook 4151.15-H by quantifying inexact or indefinite terms would make the guidance more meaningful and enforceable.

The total workload data identified in the Corporate Business Plan for the two naval shipyards for FY 1991 was overstated by 4.95 million direct labor hours (28.3 percent overstatement) when compared to the actual direct labor hours documented for FY 1991. Support documentation on the data used for preparing the projected workload data was unavailable at the naval shipyards. Therefore, the projected work load and utilization could not be calculated for the workshops at the shipyards, as required by revised draft DoD Handbook 4151.15-H.

Although we could not account for the total overstatement in the workload data, we found several factors contributing to the naval shipyards' overstatement by evaluating prior years workload data. Our analysis showed that the naval shipyards improperly included in the workload data an add-on factor of 15 percent of direct labor hours for overtime work, work that was performed outside the shipyard by direct maintenance support teams, and work performed by contractors. This occurred because the draft revised DoD Handbook 4151.15-H did not specify the type of direct labor hours that were to be included in the workload data collected and reported to OSD. As a result, utilization data calculated by the naval shipyards was inaccurate because the work load was not properly aligned to the capacity.

**Naval aviation depots' capacity and utilization data.**

**Naval Aviation Depot, Jacksonville, Florida.** At the beginning of our audit, the Navy Aviation Depot, Jacksonville, Florida, had incomplete and outdated shop drawings to support the seven workshops we evaluated in a preliminary sample. Additionally, the depot had not identified the product mix or documented the support for calculating the weighted average for maintenance work load in three workshops. As a result, work positions in three of seven workshops were unverifiable.

During the audit, the Naval Aviation Depot, Jacksonville, improved its procedures and implemented an appropriate methodology for measuring capacity. By using improved procedures and methodologies, capacity at Jacksonville was better documented than during our initial visit to the depot and we were able to determine that capacity was understated by 58,300 direct labor hours (reported capacity was 92.7 percent of actual amount) for those new workshops sampled and audited.

We could not establish the number of work stations at the Naval Aviation Depot, Jacksonville. We determined, however, that the depot capacity computations excluded at least 207 work positions for engineering personnel that were developing test program sets. With the 207 added work positions, the depot at Jacksonville understated its total capacity by 568,000 direct labor hours (reported capacity was 83.8 percent of actual capacity). We physically counted the 207 work positions, but an official at the Jacksonville depot stated that the work positions excluded in their calculations could have been as high as 360 positions. If 360 work positions were excluded in the calculations, total capacity was understated by 803,000 direct labor hours (reported capacity would be only 78.6 percent of actual capacity).

**Naval Aviation Depot, Pensacola, Florida.** The Naval Aviation Depot, Pensacola, Florida, understated its capacity by 928,000 direct labor hours (reported capacity was 79.8 percent of actual capacity). The depot maintenance personnel excluded 200 work positions for engineering personnel that were developing test program sets. During the audit, the depot designated the 200 engineering personnel as indirect, Naval Air Systems Command assets. Therefore, the depot personnel believed the engineering personnel should not be included in capacity measurement. We disagree with the depot personnel because the work positions used by the engineering personnel were physically part of the depot and the work performed was direct labor. Also, the interpretation by the Pensacola maintenance personnel that these work positions were indirect labor was inconsistent with that of the Jacksonville maintenance personnel.

**Naval aviation depots' calculations of capacity.** The naval aviation depots consistently miscalculated reserve capacity by using personnel available instead of work positions as the standard for determining this capacity, as prescribed by DoD Handbook 4151.15-H. At Jacksonville, Pensacola, and the Patuxent River Naval Aviation Depot Operations Center, maintenance personnel identified their reserve capacity by subtracting the number of personnel available at the depots from the total number of work positions. The naval aviation maintenance personnel did not accept that reserve capacity was to be determined by comparing the alignment of work load to work positions, and not from comparing the work positions to the staffing or manning of these work positions.

**Air Force logistics center capacity and utilization data.** During the audit, the Oklahoma City and Warner Robins Air Logistics Centers improved their procedures for computing capacity.

**Oklahoma City Air Logistics Center.** The Oklahoma City Air Logistics Center was implementing new procedures for measuring capacity while reorganizing its maintenance workshops. As a result, the Center reduced its total reported capacity from the 11.8 million direct labor hours of total capacity reported to OSD in the draft June 1991 Corporate Business Plan to 7.8 million hours reported to the audit staff during the audit. The Center understated current work positions representing the 7.8 million hours by 416,000 direct labor hours (5.1 percent understatement). However, the reduction from 11.8 million to 7.8 million direct labor hours was not reflected in the final December 1991 Corporate Business Plan. As a result, the total capacity reported for the Oklahoma City Air Logistics Center in the Corporate Business Plan was overstated by 3.6 million direct labor hours (43.8 percent overstatement).

**Warner Robins Air Logistics Center.** Warner Robins Air Logistics Center reorganized its maintenance workshops during the audit. At the beginning of audit, Warner Robins had an inaccurate data base for identifying work stations and over 64 percent (719 of 1,121) of the maintenance workshops identified in its data base were nonexistent. For five of six existing workshops evaluated in a preliminary sample, drawings of the workshops were incomplete and work positions in the shops were miscalculated ranging from a 3,069 direct labor hour understatement (4.0 percent understatement) to a 64,439 direct labor hour overstatement (200 percent overstatement). During a later visit to Warner Robins, we took a new sample, which showed that Warner Robins overstated its capacity by 66,000 direct labor hours, only a 0.8 percent overstatement.

**Identifying reserve and excess capacity.** Air Force logistics centers had the same problem as Army and Navy depots in using workload data for identifying reserve and excess capacity. Projected work loads were determined by Air Force Logistics Command and were not provided to the logistics centers. As a result, the logistics centers could not calculate utilization by workshop. Additionally, we were not provided sufficient data by Air Force Logistics Command or the logistics centers during the audit to verify the adequacy of the workload data presented in the draft June 1991 Corporate Business Plan.

**Marine Corps capacity and workload data.** The Marine Corps Logistics Base, Albany, Georgia, needed to improve procedures for calculating capacity data. The logistics base developed standard operating procedures to implement the revised draft DoD Handbook 4151.15-H. However, the new institutionalized procedures in the revised handbook, such as the weighted average method for calculating mixed product work loads, were not fully implemented. As a result, the logistics base understated capacity by 364,000 direct labor hours (reported capacity was 76.5 percent of actual capacity).

The Marine Corps also did not report workload data properly. Our analysis of FY 1991 actual workload data showed that work load was overstated and the utilization of the workshops was only 58 percent (based on audited capacity data) and not the 100 percent reported in the Corporate Business Plan. Analysis of FY 1991 and FY 1992 workload data showed that the data were overstated because the maintenance personnel were improperly including in the work load, labor hours carried over from prior years, second shift work, and overtime. Draft revised DoD Handbook 4151.15-H requires that workload data be aligned to an annual single-shift 40-hour week.

### **Conclusion**

The Military Departments have not developed uniform and accurate capacity baselines for reporting utilization of their maintenance depots. Existing data cannot be fully relied on for comparisons or future decisions made in OSD affecting the Military Departments' depots.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION**

1. We recommend that the Assistant Secretary of Defense (Production and Logistics) formalize revised draft DoD Handbook 4151.15-H to include:

a. Specific cut-off dates for measuring and reporting capacity data,

b. Requirements for training depot maintenance personnel in the methodologies for measuring capacity and calculating utilization,

c. Procedures for validating data by personnel independent of the measurement process,

d. Requirements for retaining, for 3 years, records of data collected and calculated to support summary data reported to the Office of the Secretary of Defense,

e. Definitions of the specific workload data that will be collected and used for comparisons or alignment with capacity data.

f. Methodologies for:

(1) Computing capacity and utilization that quantify criteria to the maximum extent possible.

(2) Calculating reserve and excess capacity that provide detailed explanations of how capacities should be determined and identified and provide specific examples of these types of calculations.

(3) Counting uncovered work areas and provide specific examples.

(4) Allocating quality assurance personnel, direct support maintenance teams, and variable product mixes that consist of standard or uniform formulas for calculating capacity among depots.

2. We recommend that the Commander, U.S. Army Materiel Command; the Commander, Air Force Materiel Command; the Deputy Chief of Naval Operations (Logistics); and the Deputy Chief of Staff for Installations and Logistics, Headquarters, U.S. Marine Corps implement effective internal control procedures that will provide for full compliance with the requirements of DoD Handbook 4151.15-H.

#### MANAGEMENT COMMENTS AND AUDIT RESPONSE

The Assistant Secretary of Defense (Production and Logistics) concurred with Recommendation 1. The complete text of the Assistant Secretary's comments is in Part IV of this report. No additional comments are required

The Assistant Secretary of the Army (Installations and Logistics) concurred with Recommendation 2. The complete text of the Army's comments is in Part IV of this report. No additional comments are required.

The Assistant Secretary of the Navy (Research, Development and Acquisition), concurred with Recommendation 2. and stated that effective internal control procedures would be implemented within 6 months of formal publication of DoD Handbook 4151.15-H. The complete text of the Navy's comments is in Part IV of this report. The Navy's planned actions satisfy the intent of the recommendation and additional comments are not required.

The Air Force Deputy Chief of Staff for Logistics, Chief of Maintenance Policy Division, stated that the Air Force will take the necessary steps to comply with the requirements of the revised draft DoD Handbook 4151.15-H after the Assistant Secretary of Defense (Production and Logistics) formalizes the Handbook. The complete text of the Air Force's comments is in Part IV of this report. Although the Air Force did not specifically concur or nonconcur with the finding and Recommendation 2., the Air Force's planned actions satisfy the intent of the recommendation and additional comments are not required.

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PART III - ADDITIONAL INFORMATION

APPENDIX A - Definition of Terms

APPENDIX B - Primary Criteria Specified in Revised  
Draft DoD Handbook 4151.15-H

APPENDIX C - Statistical Sampling Plan and Results

APPENDIX D - Summary of Benefits Resulting from Audit

APPENDIX E - Activities Visited or Contacted

APPENDIX F - Report Distribution

## **APPENDIX A: DEFINITION OF TERMS**

**Annual paid hours:** The annual work hours per worker, including holidays, for a single shift, 40-hour workweek for which an employee is paid.

**Annual productive hours:** That portion of the annual paid hours per production worker that remains for direct application to the job after subtraction of holidays, leave, training, and other recognized indirect hours.

**Availability factor:** The percentage of a single-shift work year in which work positions can be used to accomplish direct productive work.

**Capacity index:** The amount of work load, expressed in actual direct labor hours, that a facility can effectively produce annually on a single-shift, 40-hour week basis while producing the product mix that the facility is designed to accommodate. The formula for computing the capacity index is:

$$\frac{\text{work positions} \times \text{availability factor} \times \text{annual productive hours}}{\text{annual productive hours}}$$

**Excess capacity:** Capacity for which no requirement exists.

**Index:** A hybrid number used to characterize different sets of data. An index determined in accordance with DoD Handbook 4151.15-H is a general indicator rather than a precise measure. As index data are aggregated, their significance may decrease.

**Mission utilization index:** An indicator, expressed as a percentage, of the degree of alignment of executable requirements to the designed capacity of a shop or depot.

**Mobilization utilization index:** An indicator, expressed as a percentage, of the degree of alignment of mobilization requirements to the designed physical capacity of a shop or depot.

**Peacetime utilization index:** An indicator, expressed as a percentage, of the degree of alignment of funded, planned, or actual work load to the designed capacity of a shop or depot after allowing for necessary reserve capacity.

## **APPENDIX A: DEFINITION OF TERMS** (cont'd)

**Physical capacity index:** The amount of work load, expressed in actual direct labor hours, that a facility can accommodate with all work positions continuously manned on a single-shift, 40-hour week basis, while producing the product mix the facility is designed to accommodate. The physical capacity index is used for mobilization planning purposes only. The formula for computing the physical capacity index is:

work positions x availability factor x annual paid  
hours

**Product mix:** A combination of heterogeneous work loads usually consisting of portions related to major systems, subsystems, components, stock classes, or items.

**Reserve capacity:** Capacity that is not utilized but is retained for reasons of military necessity or as sound business practice.

**Workshop:** A work center, functional work group, or resource group that contains one or more work stations that perform depot maintenance work.

**Utilization index:** An indicator, expressed as a percentage, of the degree of alignment of work load to the designed capacity of a shop or depot, after allowing for reserve capacity.

**Work position:** The designated space of equipment or process usage that can be occupied consistently by one direct production worker to accomplish the assigned task on a full-time basis. A work position may include more than one location if the worker moves to other locations to accomplish the assigned task.

**Work station:** The lowest order of equipment, or process location, that requires separate analysis of work flow and function during the capacity index calculation. It will consist of one or more work positions as determined by the criteria used in the capacity index calculation in DoD Handbook 4151.15-H.

**APPENDIX B: PRIMARY CRITERIA SPECIFIED IN REVISED DRAFT**  
**DOD HANDBOOK 4151.15-H**

**Annual productive hours:** The annual productive direct labor hours will be 1,615 direct labor hours per work position in all cases except Naval Sea Systems Command Naval Shipyard Output Shops, which will use 1,537 direct labor hours.

**Availability factor:** For capacity and utilization index calculations, the availability factor will be 0.95.

**Reserve capacity index:** Reserve capacity shall be expressed as an index in direct labor hours at shop and depot activity levels. After determining the capacity index of a shop, it is appropriate to then identify reserve and excess (see below) capacity in relation to actual and planned work loads.

**Excess capacity:** Excess capacity will be separately identified by shop and the following information will be recorded: depot, shop name, and direct labor hours.

**Peacetime utilization index:** The peacetime utilization formula is:

$$\frac{\text{Funded Workload}}{\text{Capacity Index}} \times 100 = \text{___ percent}$$

**Mission utilization index:** The formula for the mission utilization index is:

$$\frac{\text{Executable Requirements}}{\text{Capacity Index}} \times 100 = \text{___ percent}$$

**Mobilization utilization index:** The formula for the mobilization utilization index is:

$$\frac{\text{Mobilization Requirements}}{\text{Physical Capacity Index}} \times 100 = \text{___ percent}$$

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## APPENDIX C: STATISTICAL SAMPLING PLAN AND RESULTS

We visited nine Military Departments' maintenance depots to statistically sample the total workshops at these depots. Norfolk Naval Shipyard and Charleston Naval Shipyard identified only six workshops and we judgmentally selected five of the workshops for evaluation of work positions and direct labor hours in these workshops.

Anniston Army Depot; Corpus Christi Army Depot; Naval Aviation Depot, Jacksonville; Naval Aviation Depot, Pensacola; Oklahoma City Air Logistics Center; Warner Robins Air Logistics Center; and Marine Corps Logistics Base, Albany, provided data listings with varying cutoff dates. The dates ranged from September 6, 1991, for Anniston Army Depot, to January 17, 1992, for the Marine Corps Logistics Base, Albany, with the total workshops itemized for each of the depots. The seven data listings contained a total universe of 1,777 workshops. We used a nonrestricted variable sampling plan to select a random sample of 182 workshops that contained clusters of work positions in the workshops. A breakdown of the universe and sample size of workshops for each depot is included below.

Quality Assurance work positions and work positions that were discovered external to the audited universe were excluded from the sample data. However, they were added to the total projected depot direct labor hours after the sample projections were made.

<u>Depot</u>	<u>Audit Sample Data</u>				Capacity	Capacity	<u>Change **</u>
	<u>Shops Reported</u>	<u>Shops Selected</u>	<u>Positions Reported</u>	<u>Positions Audited</u>	<u>Reported * (Thousand)</u>	<u>Projected * (Thousand)</u>	
Anniston, Alabama	66	23	1,074	1,136	4,297	4,511	- 214
Corpus Christi, Texas	91	25	816	711	5,182	4,356	+ 826
Jacksonville, Florida	86	20	482	520	2,941	3,509	- 568
Pensacola, Florida	150	20	414	468	3,662	4,590	- 928
Charleston, South Carolina	2	2	381	956	556	3,025	- 2,469
Norfolk, Virginia	4	3	633	972	1,010	2,962	- 1,952
Oklahoma City, Oklahoma	1,042	54	486	500	7,809	8,225	- 416
Warner Robins, Georgia	323	30	489	485	7,915	7,849	+ 66
Albany, Georgia	19	10	265	357	1,184	1,548	- 364

\* Capacity (in total direct hours) = work positions x .95 (availability factor) x 1,615 or 1,537 (annual productive hours).

\*\* Minus means the capacity reported was understated and plus means the capacity reported was overstated.

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**APPENDIX D: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT**

<u>Recommendation Reference</u>	<u>Description of Benefit</u>	<u>Type of Benefit</u>
1.	<u>Internal Control.</u> OSD will implement policies and procedures for measuring capacity and reporting utilization of DoD maintenance depot systems in DoD.	<u>Nonmonetary.</u>
2.	<u>Internal Control.</u> Military Departments will implement internal controls to comply with OSD guidance for measuring capacity and reporting utilization data.	<u>Nonmonetary.</u>

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## APPENDIX E: ACTIVITIES VISITED OR CONTACTED

### Office of the Secretary of Defense

Deputy Assistant Secretary of Defense (Logistics), Office of the  
Assistant Secretary of Defense (Production and Logistics),  
Washington, DC

### Department of the Army

Office of the Deputy Chief of Staff for Logistics, Washington, DC  
Army Materiel Command, Alexandria, VA  
Army Depot Systems Command, Chambersburg, PA  
Anniston Army Depot, Anniston, AL  
Corpus Christi Army Depot, Corpus Christi, TX

### Department of the Navy

Office of the Assistant Secretary of the Navy (Research,  
Development, and Acquisition), Washington, DC  
Naval Aviation Systems Command, Arlington, VA  
Naval Sea Systems Command, Arlington, VA  
Naval Aviation Depot Operations Center, Patuxent River, MD  
Naval Aviation Depot, Jacksonville, FL  
Naval Aviation Depot, Pensacola, FL  
Charleston Naval Shipyard, Charleston, SC  
Norfolk Naval Shipyard, Portsmouth, VA

### Department of the Air Force

Office of the Deputy Chief of Staff (Logistics and Engineering),  
Washington, DC  
Air Force Logistics Command, Wright-Patterson Air Force Base, OH  
Oklahoma City Air Logistics Center, Oklahoma City, OK  
Warner Robins Air Logistics Center, Robins Air Force Base, GA

### Marine Corps

Office of the Deputy Chief of Staff (Installations and  
Logistics), Arlington, VA  
Marine Corps Logistics Base, Albany, GA

### Other DoD Activities

Joint Depot Maintenance Analysis Group, Dayton, OH

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## APPENDIX F: REPORT DISTRIBUTION

### Office of the Secretary of Defense

Assistant Secretary of Defense (Production and Logistics)  
Assistant Secretary of Defense (Public Affairs)  
Comptroller of the Department of Defense

### Department of the Army

Secretary of the Army  
Inspector General, Department of the Army  
Auditor General, U.S. Army Audit Agency

### Department of the Navy

Secretary of the Navy  
Assistant Secretary of the Navy (Financial Management)  
Auditor General, Naval Audit Service

### Department of the Air Force

Secretary of the Air Force  
Assistant Secretary of the Air Force (Financial Management and  
Comptroller)  
Air Force Audit Agency

### Defense Agencies

Director, Defense Contract Audit Agency  
Director, Defense Logistics Studies Information Exchange

### Non-DoD Activities

Office of Management and Budget  
U.S. General Accounting Office  
NSIAD Technical Information Center  
NSIAD Director for Logistics

**APPENDIX F: REPORT DISTRIBUTION (cont'd)**

**Chairman and Ranking Minority Member of the following  
Congressional Committees and Subcommittees:**

Senate Subcommittee on Defense, Committee on Appropriations  
Senate Committee on Armed Services  
Senate Committee on Government Affairs  
House Committee on Appropriations  
House Subcommittee on Defense, Committee on Appropriations  
House Committee on Armed Services  
House Committee on Government Operations  
House Subcommittee on Legislation and National Security,  
Committee on Government Operations



**PART IV - MANAGEMENT COMMENTS**

Assistant Secretary of Defense (Production and Logistics)  
Comments

Department of the Army Comments

Department of the Navy Comments

Department of the Air Force Comments

**MANAGEMENT COMMENTS: ASSISTANT SECRETARY OF DEFENSE (PRODUCTION AND LOGISTICS)**



PRODUCTION AND  
LOGISTICS

**ASSISTANT SECRETARY OF DEFENSE**

WASHINGTON, D.C. 20301-8000

August 3, 1992

(L/MD)

**MEMORANDUM FOR ASSISTANT IG FOR AUDITING**

**SUBJECT: Report on the Audit of Capacity and Utilization of DoD Maintenance Depots (Project No. 1LB-5017)**

During the deliberations leading to the establishment of the Defense Depot Maintenance Council (DDMC), we agreed to revise the procedures and methodology for measuring and reporting capacity and utilization. Concurrently, the Services agreed to recalculate their data based on the revised procedures and methodology. Because these revised calculations formed a new baseline against which future changes will be measured, there was an urgent need to ensure the validity of the current data. Accordingly, as part of our commitment to improving this process, we asked the DoD IG to review the depot procedures for measuring capacity and utilization. The fine efforts of your staff in accomplishing this audit is appreciated.

Attached are the recommendations applicable to ASD(P&L). We concur with these recommendations. DoD Directive 4151.15 is being replaced by 4151.18. The revised Handbook will be published as DoD 4151.18-H subsequent to the publication of DoD Directive 4151.18. Publication of the Handbook should be completed prior to December 31, 1992.

A handwritten signature in cursive script that reads "Colin McMillan".

Colin McMillan

Attachment



MANAGEMENT COMMENTS: DEPARTMENT OF THE ARMY



DEPARTMENT OF THE ARMY  
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS  
WASHINGTON, DC 20310-0500



DALO-SMM

28 JUL 1992

MEMORANDUM THRU

~~DEPUTY CHIEF OF STAFF FOR LOGISTICS~~

~~DIRECTOR OF THE ARMY STAFF~~

ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, LOGISTICS  
AND ENVIRONMENT)

FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE (ANALYSIS AND  
FOLLOWUP)

SUBJECT: DODIG Draft Report, Capacity and Utilization of DOD  
Maintenance Depots (AMC No. 1LB-5017) --ACTION MEMORANDUM

1. HQDA IG memorandum of 14 May 1992 (Tab A) asked ODCSLOG to respond to your memorandum of 8 May 1992 (Enclosure to Tab A).
2. The Army position is at Tab B.

Encl

*James W. Ball*  
JAMES W. BALL  
Major General, GS  
Director of Supply  
and Maintenance

Eric A. Orsini  
Deputy Assistant Secretary of the Army  
(Logistics)  
ASA (I, L&S)

**MANAGEMENT COMMENTS: DEPARTMENT OF THE ARMY (cont'd)**

**COMMAND REPLY**

**DODIG DRAFT REPORT, CAPACITY AND UTILIZATION OF DOD MAINTENANCE DEPOTS, PROJECT 1LB-5017 (AMC NO. D9148)**

**FINDING.** Although improvements have been made, the weapon systems maintenance depots' capacity and utilization data that the Military Departments reported to OSD were inaccurate or incomplete. This occurred because the Military Department did not fully comply with the requirements for calculating capacity and utilization data contained in the July 1976 DOD Handbook 4151.15H and its December 1990 revised draft. Delays in formally issuing the draft revision to DOD Handbook 4151.H and certain ambiguities in the revised draft also contributed to these deficiencies. As a result, OSD could not rely on the weapon systems maintenance depots' capacity baseline data reported by the Military Departments for making decisions, including decisions relating to achieving the FY 1991 through FY 1996 savings of \$640 million that the Military Departments are to achieve through more efficient capacity utilization of their maintenance depots.

**RECOMMENDATION 2.** We recommend that the Commander, U.S. Army Materiel Command; the Commander, Air Force Logistics Command; the Deputy Chief of Naval Operations (Logistics); and the Deputy Chief of Staff for Installations and Logistics, Headquarters, U.S. Marine Corps implement effective internal control procedures that will provide for full compliance with the requirements of DOD Handbook 4151.15H.

**ACTION TAKEN.** Concur. AMC will take action to insure internal control procedures will be implemented in August 1992 that will provide full compliance with the requirements of DOD Handbook 4151.15-H.

**MANAGEMENT COMMENTS: DEPARTMENT OF THE NAVY**



**THE ASSISTANT SECRETARY OF THE NAVY**  
(Research, Development and Acquisition)  
WASHINGTON, D.C. 20350-1000

**JUL 21 1992**

**MEMORANDUM FOR THE DEPARTMENT OF DEFENSE INSPECTOR GENERAL**

**Subj: DRAFT REPORT ON THE AUDIT OF CAPACITY AND UTILIZATION OF DOD  
MAINTENANCE DEPOTS (1LB-5017) - ACTION MEMORANDUM**

**Ref: (a) DODIG Memo of 8 May 1992**

**Encl: (1) DON Response to Draft Audit Report**

This is in response to the draft audit report forwarded by reference (a) concerning the audit of capacity and utilization of depot maintenance facilities.

The Department of the Navy response is provided at enclosure (1). We concur with the recommendation to implement effective internal control procedures that will provide for full compliance with the requirements of DOD Handbook 4151.15-H.

  
Gerald A. Cann

Copy to:  
NAVINGEN  
NAVCOMPT (NCB-53)

**MANAGEMENT COMMENTS: DEPARTMENT OF THE NAVY (cont'd)**

**Department of the Navy Response  
to  
DODIG Draft Report of May 8, 1992  
on  
Capacity and Utilization of DoD  
Maintenance Depots  
Project No. 1LB-5017**

**Finding:**

The Military Departments have not developed uniform and accurate capacity baselines for reporting utilization of their maintenance depots. Existing data cannot be fully relied on for comparisons or future decisions made in the Office of the Secretary of Defense (OSD) affecting the Military Department's depots.

**Recommendation 2:**

We recommend that the Commander, U. S. Army Material Command; the Commander, Air Force Logistics Command; the Deputy Chief of Naval Operations (Logistics) and the Deputy Chief of Staff for Installations and Logistics, Headquarters, U. S. Marine Corps implement effective internal control procedures that will provide for full compliance with the requirements of DoD Handbook 4151.15-H.

**DCN Position:**

Concur. We are concerned that capacity measurements and utilization calculations are snapshots in time. These measurement processes have little value at the micro level. However, we support the intent of this recommendation and have instituted actions to implement such procedures upon formal publication of the final handbook.

Estimated completion date: Within six months of formal publication.

Enclosure (1)

MANAGEMENT COMMENTS: DEPARTMENT OF THE AIR FORCE



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS UNITED STATES AIR FORCE  
WASHINGTON DC

28 JUL 1992

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING  
OFFICE OF THE INSPECTOR GENERAL  
DEPARTMENT OF DEFENSE

SUBJECT: DoD(IG) Draft Report, "Audit of Capacity and Utilization  
of DoD Maintenance Depots," (Project No. 1LB-5017) -  
INFORMATION MEMORANDUM

This is in reply to your memorandum requesting the Assistant  
Secretary of the Air Force (Financial Management and Comptroller)  
provide Air Force comments on the subject report.

The Assistant Secretary of Defense (Production and Logistics)  
has not completed the coordination process and formalized the  
revised DoD Handbook 4151.15-H. The Military Departments can not  
comply with the requirements of the revised draft DoD Handbook  
until it becomes formalized. We are continuing to work with OSD  
to resolve this issue. Once the DoD Handbook 4151.15-H is  
formalized the Air Force will take all the necessary steps to  
insure compliance.

A handwritten signature in dark ink, appearing to read "Robert L. Storer", is located below the main text.

ROBERT L. STORER  
Assistant Secretary  
for Maintenance, AFCE/Logistics

**LIST OF AUDIT TEAM MEMBERS**

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